DOCUMENT RESUME

ED 436 669 CE 079 540

| | |
|---|---|
| AUTHOR | Lee, Lung-Sheng Steven |
| TITLE | Technology Education Reform in Taiwan. |
| PUB DATE | 2000-01-00 |
| NOTE | 12p.; Paper presented at the Annual Meeting of the Australian Council of Education through Technology and Biennial International Conference on Technology and Education (Canberra, Australia, January 10-14, 2000). |
| PUB TYPE | Reports - Descriptive (141) -- Speeches/Meeting Papers (150) |
| EDRS PRICE | MF01/PC01 Plus Postage. |
| DESCRIPTORS | *Curriculum Development; Developing Nations; *Educational Change; Elementary Secondary Education; Foreign Countries; Integrated Curriculum; National Standards; Sciences; *Technology Education |
| IDENTIFIERS | *Taiwan |

ABSTRACT

Technology education in Taiwan, presently called living technology (LT), is a new area that has evolved from handicraft, industrial arts, and other areas. LT is offered mainly at the secondary school level, although it is required for all students in grades 1-11. In response to calls for curriculum reform, the present elementary and junior high school (grades 1-9) curriculum standards are being revised. Anticipated to be put into effect in 2001, the revised national curriculum emphasizes curricular coherence and integration and more school-based development and management. In these new national curriculum standards, renamed "curriculum syllabi," are seven learning areas: language, mathematics, science and technology, social studies, arts, health and physical education, and comprehensive activities. Technology education is expected to unify with science. The curriculum is intended to be skill oriented and must be aligned with further instruction and assessment. The following three dimensions have been used to guide the development of themes and further technology learning activities, assessment rubrics, etc.: context, scope, and content and process. Four characteristics of the new technology curriculum are technology education is interwoven with science; curriculum, instruction, and assessment are skill-oriented; technology education is substantially rooted in elementary schools; and the problem-solving process is emphasized. (The content framework of the new technology curriculum and the suggested time allocation for the new program are presented.) (YLB)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 436 669

Running head: TECHNOLOGY EDUCATION REFORM IN TAIWAN

# Technology Education Reform in Taiwan

Lung-Sheng Steven Lee
National Taiwan Normal University

Paper presented at
the ACET2000 Conference, Incorporated with the ICTE Biennial Conference,
Canberra, Australia
January 10-14, 2000

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.



BEST COPY AVAILABLE

**Abstract**

In Taiwan, technological studies, normally called "living technology (LT)," are required for all students in grades 1-11. At present, Taiwan is almost complete with its national curriculum revision for grades 1-9. This paper describes the technology education in the wave of curriculum reform. The following four characteristics are found in the new technology curriculum: (1) technology education interwoven with science; (2) curriculum, instruction and assessment are skill-oriented; (3) technology education substantially rooted in elementary schools; (4) problem-solving process emphasized.

## Technology Education Reform in Taiwan

On September 21 (921), 1999, a killer earthquake hit Taiwan. There is never a good time for an earthquake, but Taiwan is finally shaking off the quake blues. At present, the people in Taiwan are again paying attention to the presidential campaigns and the curriculum reform for grades 1-9. This paper discusses the technology education in the wave of curriculum reform.

### Technology Education in Taiwan Is New

Although its predecessors entitled "handicraft," "industrial arts," etc., existed in schools for around 100 years, technology education in Taiwan is a new area that has evolved from its predecessors. Presently called "living technology (LT)," technology education is mainly offered at the secondary school level.

In 1996, Dr. Richard Kimbell, a professor at the University of London, spent six months visiting Australia, Germany, Taiwan, and the United States in 1996 to collect data regarding school systems, technology curriculum, and assessment practice. Arranging the data in the United Kingdom, he published a book entitled "Assessing Technology: International Trends in Curriculum and Assessment" in 1997. In this book, Dr. Kimbell first describes the three aspects (school systems, technology curriculum, and assessment practice) in each of those five countries, then makes a cross-country comparison.

The reason that Dr. Kimbell selected Taiwan from among Asian countries as one of his subjects is that Taiwan is a powerful modern country of manufacturing, but still preserves a deep Chinese culture. Dr. Kimbell believes that Taiwan was very dynamic, favoring the American style, and cherished education. He criticizes that in Taiwan there are few technological topics in elementary school curriculum. Industrial arts at the secondary school level emphasizes woodworking, metalworking and graphics.

In his cross-country comparison, Dr. Kimbell claims that a successful technology curriculum results from the following four stages: (1) Teacher experiment – Teachers test new ideas and practices them in his/her individual class. (2) Central involvement – The central government is involved in developing and promoting instructional materials to support teachers. (3) Required curriculum – The central government has a mandated curriculum and sets assessment measures. (4) Teacher adaptation – Teachers adapt the instructional materials developed by the central government to make them relevant (see Figure 1). Obviously, stages 1 and 4 rely on the teachers' action, while stages 2 and 3 are based on central policy. Regarding the technology curriculum in Taiwan, Dr. Kimbell criticizes that few were done with stage 1,

"living technology" at the secondary school level had attained stage 2, and "living technology" for junior high school students was in stage 3. He also criticizes the central government in Taiwan for starting to implement "living technology" only because of pressure of other countries promoting technology education. However, due to the lack of solid experience in stages 1 (teacher experiment) and 2 (central involvement), how school teachers will appropriately adapt instructional materials to their classes (i.e., step in stage 4) is still being examined.

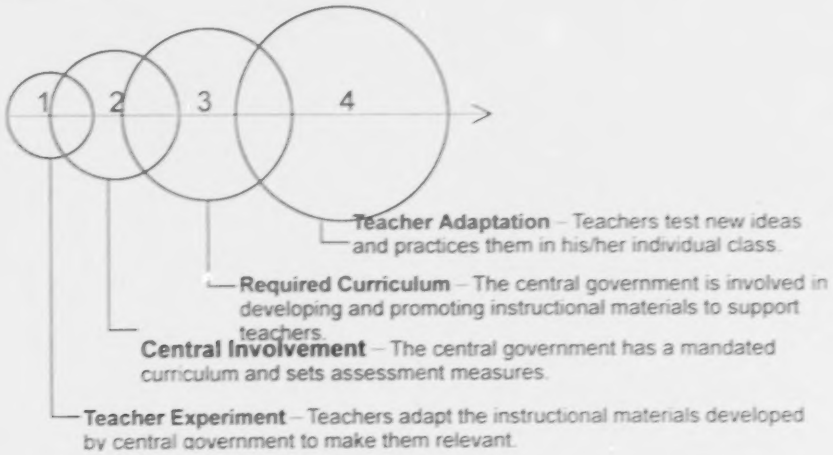
1
2
3
4
Teacher Adaptation – Teachers test new ideas and practices them in his/her individual class.
Required Curriculum – The central government is involved in developing and promoting instructional materials to support teachers.
Central Involvement – The central government has a mandated curriculum and sets assessment measures.
Teacher Experiment – Teachers adapt the instructional materials developed by central government to make them relevant.

Figure1. Four stages of a successful technological curriculum evolves.

**Present Technological Curriculum Is Being Revised**

The present school system in Taiwan is based on the 6-3-3 system: six years in elementary school, three years in junior high school (JHS), three years in senior high school (SHS) or senior vocational school (SVS) (see Figure 2). Curriculum standards for each school level are determined and promulgated by the Ministry of Education (MOE), and each school's curriculum is planned in accordance with and authorized textbooks are edited on the basis of the national curriculum standard. Secondary-school technology education is prescribed in the curriculum standards; the present junior-high-school and senior-high-school curriculum standards went into effect in the 1997 and 1999 school years, respectively. Based on the present curriculum standards, the main subjects of technology education can be summarized as shown in Table 1. In addition, some elective courses related to technology education are recommended in both the junior-high and senior-high curriculum standards. Compared to Industrial Arts (IA), Living Technology (LT) is more systematic and design-oriented with an emphasis on gender equity.



BEST COPY AVAILABLE

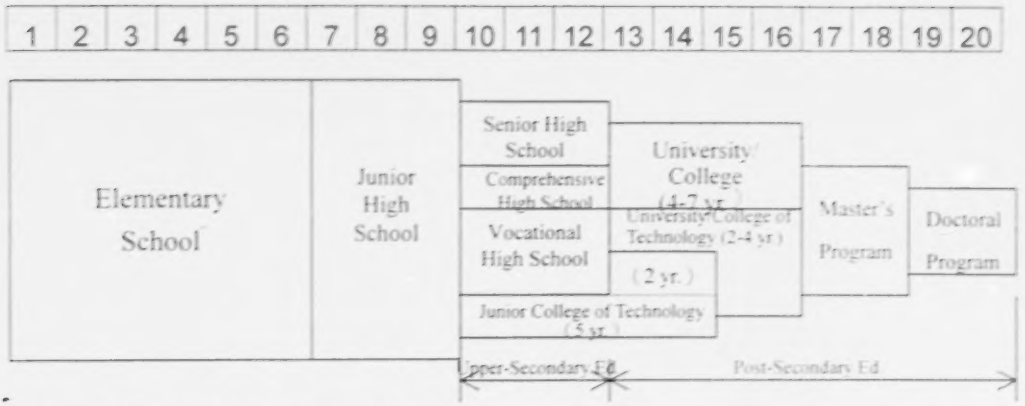
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Elementary School
Junior High School
Senior High School
Comprehensive High School
Vocational High School
University/ College (4-7 yr.)
University/College of Technology (2-4 yr.)
(2 yr.)
Junior College of Technology (5 yr.)
Master's Program
Doctoral Program
Upper-Secondary Ed.
Post-Secondary Ed.

Figure 2. Schooling system of Taiwan.

Table 1.

Secondary-school Technology Curricula in Taiwan.

| Level | Past Title and Synopsis | Present Title and Synopsis |
|---|---|---|
| Junior high (Grades 7-9) | **Industrial Arts (IA)**<br>-All students in grades 7-9 are required to take "Industrial Arts" (IA) or "Home Economics" (HE), but schools Commonly assign boys to IA Programs.<br>-IA consists of two hours/week or about 216 hours in three years.<br>-IA consists of 13 domains. | **Living Technology (LT)**<br>-All students in grades 7-9 are required to take "Home Economics & Living Technology" (HE&LT), two hours/week.<br>-LT in HE&LT consists of one hour/week or about 108 hours in three years.<br>-LT includes 4 domains. |
| Senior high (Grades 10-12) | **Industrial Arts (IA)**<br>-All students in grades 10 and 11 are required to take IA or HE, but schools commonly assign boys to IA programs.<br>-Two hours/week or about 144 hours in two years.<br>-IA consists of five domains. | **Living Technology (LT)**<br>-All students in grades 10 and 11 are required to take HE&LT, two hours/week.<br>-LT in HE&LT consists of one hour/week or about 72 hours in two years.<br>-LT includes four domains, which are the same as those in junior-high-school LT. |

Source: Lee, 1997; Ku & Lee, 1999.

In response to calls for curriculum reform, the present elementary and junior-high school (i.e., grades 1-9) curriculum standards are currently being revised. The newly revised national curriculum, anticipated to be put into effect in 2001, emphasizes curricular coherence and integration as well as more school-based development and management.



BEST COPY AVAILABLE

**Technology Education Is Expected to Unify with Science**

In the new national curriculum standards for grades 1-9, renamed as "curriculum syllabi," there are seven learning areas: language, mathematics, science and technology, social studies, arts, health and physical education, and comprehensive activities. Technology education is expected to unify with science. Following the philosophy that curriculum should be skill-oriented and must be aligned with further instruction and assessment, the technological curriculum development taskforce, chaired by this author, has already completed a draft of the curriculum syllabus and has submitted it to the Ministry of Education.

In the draft of the syllabus, the technology taskforce argues that technology and science are different bodies of knowledge. That is, technology is beyond applied science (see Figure 3). The content framework of the new technology curriculum is shown in Table 2. Suggested time allocation for this new program is shown in Table 3.

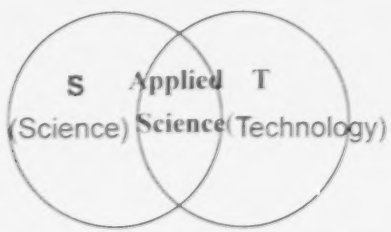


Figure 3. Technology and science are different bodies of knowledge.

Table 2.

The Content Framework of the New Technology Curriculum.

| | | Grades | | | |
|---|---|---|---|---|---|
| | | 1.2 | 3.4 | 5.6 | 7.8.9 |
| Techno-logical Nature | Evolution and develop-ment | Technological invention | Technological Evolution | Technologi-cal Link | Technological issue |
| | Relation-ship and impact | Relationship between technology and individual | Relationship between technology and family | Technologi-cal impact on environment | Technological impact on society |
| Techno-logical Scope | Commu-nication | Daily technological product | Technological Resource | Technologi-cal systemic model | Information processing |
| | Construc-tion | | | | Architectural structure |
| | Manufac-turing | | | | Material processing |
| | Transpor-tation | | | | Transportation vehicle |
| | Informa-tion | | | | Networking application |
| Creation and Produc-tion | Creativity and communi cation | Oral communication for ideas | Graphics, words and signs | Image and sound | Drafting and blueprint reading |
| | Design and making | Appearance and function | Problem-solving and design | Modeling | Production process simulation and product making |

Table 3.

Suggested Time allocation for the New Technology Education Program.

| Grades | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Hours | 10 | | 10 | | 40 | | 120 | | |

Notes:

1. In grades 1-2, Science & Technology (S&T), Social Studies, and Arts should be integrated. Thus, 10 hours are allocated for this part of technology education.
2. In grades 3-4, 10 hours are allocated for the combined S&T course.
3. In grades 5-6, 40 hours are allocated for an independent Technology course, two hours per week and lasting a semester.
4. In grades 7-9, 120 hours are allocated for an independent Technology course, two hours per week and lasting one year.

At this moment, the technology curriculum development taskforce keeps developing example themes for technological instruction and assessment measures. The three dimensions, shown in Figure 4, have been utilized to guide the development of themes and further technology learning activities (TLA's), assessment rubrics, etc.

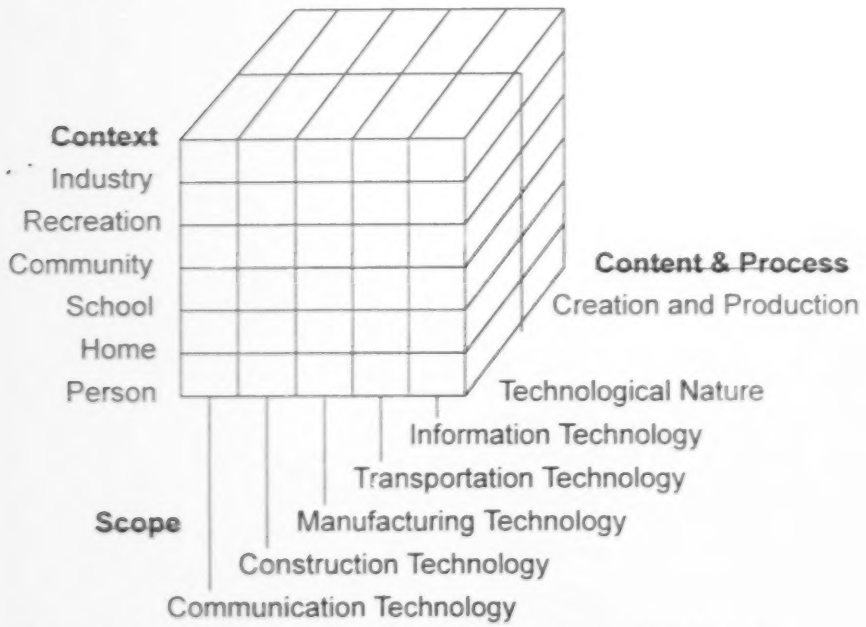


Figure 4. A matrix utilized to guide the development of themes.

Based on the above description, the following four characteristics are

found in the reform of the technology curriculum:

1. Technology education is interwoven with science.
   Under the same learning area, S&T, technology education needs to coordinate with science, such as biology, physics and chemistry. This means that professional development of teachers should pay attention to the interdisciplinary approach of science and technology.
2. Curriculum, instruction and assessment are skill-oriented .
   Skills that all people need to interact in a technological society (i.e., technological literacy) are supposed to be clearly identified and the curriculum has been developed based on the skills. Later on instruction and assessment should align with skills and curriculum (see Figure 5).

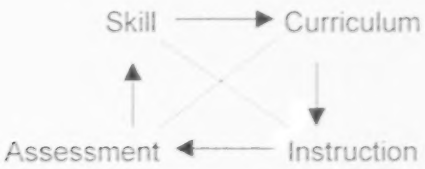


Figure 5. The network of skill, curriculum, instruction, and assessment.

3. Technology education may be substantially rooted in elementary schools.
   As Dr. Kimbell criticized, few technological topics were taught in elementary schools. Hopefully, the new curriculum syllabi will make a substantial difference.
4. The problem-solving process is emphasized.
   Higher-order thinking, or the intellectual process, is enhanced in the new curriculum. That is, the problem-solving process is incorporated into the contents of technology education (see Figure 6).

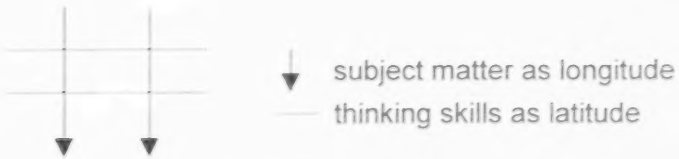


Figure 6. Thinking skills are interwoven with the subject matter.

When the curriculum syllabi for grades 1-9 were being drafted, the presidential campaign was in progress. A president employs the butterfly, shown in Figure 3, for his CIS (corporate identity system). The body of the butterfly is in the shape of Taiwan. Crossing the tropical and subtropical latitudes, Taiwan has a variety of butterflies. A butterfly metamorphoses from a

caterpillar. People usually prefer butterflies to caterpillars. Reform is like this transformation. Hopefully, the reform of technology education in Taiwan may transform "a caterpillar" into "a butterfly."

Figure 3. A President Candidate's CIS.
Note: The Chinese slogan indicates "Work together, Taiwan takes off.



BEST COPY AVAILABLE

## References

Kimbell, R. (1997). Assessing technology: International trends in curriculum and assessment. London: Open University Press.

Ku, G., & Lee, L. S. (1999). Technology education in Taiwan. TTTe, ITEA's Online extension of The Technology Teacher. Available on http://www.iteawww.org/F3q.html.

Lee, L. S. (1997). Moving from industrial arts to living technology: The status of technology education in Taiwan, R.O.C. Paper presented at the 1997 International Conference on Technology Education in the Asia-Pacific Region (ICTE'97), Taipei, Taiwan, April 23-26.

## Author Note

Dr. Lung-Sheng Steven Lee (李隆盛) is a professor and the head of the Department of Industrial Technology Education at National Taiwan Normal University (NTNU); the secretary-general of the Industrial Technology Education Association (ITEA, formerly called the Chinese Industrial Arts Education Association--CIAEA), Taiwan, R.O.C.; the executive director of the Society for Training and Development, Taiwan, R.O.C. (STD, Taiwan); and an adviser to the Ministry of Education (MOE), Taiwan, R.O.C.

Correspondence concerning this paper should be addressed to Lung-Sheng Steven Lee, Department of Industrial Technology Education, National Taiwan Normal University, 162 Hoping E. Rd., Sec. 1, Taipei 106, Taiwan, R.O.C. Electronic mail may be sent via the Internet to t83006@cc.ntnu.edu.tw.